

REMARKS

Reconsideration and allowance of this application are respectfully requested in view of the above amendment and the discussion below.

Applicants' invention is addressed to a process for producing continuous grating structures which are formed as line gratings wherein distances of between 100 nm and 2500 nm between consecutive grating lines are able to be provided on a substrate by covering the surface of the substrate with a photoresist layer.

The method of independent claim 42 and dependent claims 43-62 has been rejected under 35 U.S.C. 103 as unpatentable over the reference to Lyndin U.S. Patent No 6,218,194 in view of Capodieci U.S. Patent NO. 6,013,396 for the reasons indicated at pages 6-9 of the Patent Office Action.

According to the statement of the rejection, the reference to Lyndin has a process for producing a grating structure with a phase mask but that the specific structure of the mask is not disclosed. The reference to Capodieci has been cited for disclosing a phase mask for use in the same type of photolithographic process as the present invention. Therefore, according to the rejection, it would have been obvious to specifically use the Capodieci mask with the Lyndin process because it would be desirable to maximize the available grating resolution.

Applicants respectfully traverse this rejection on the grounds that independent claim 42 recites method steps which are not available from the references or their combination.

Prior to discussing the disclosures of the references to Lyndin and Capodieci, Applicants wish to indicate that the present invention concerns a phase mask and does not concern and is not the same as a "phase shift mask". The reference to Lyndin U.S. Patent No. 6,218,194 has a manufacturing process with an exposure method concerning a "mask" which has a prior art chrome mask on quartz or which uses a direct holographic method having crossed laser beams. This is discussed in the specification of Lyndin at column 9, lines 65 and 66. In contrast, the present invention, as defined independent claim 42, recites a "phase mask". Such a phase mask is known and is disclosed as a quartz mask substrate which contains a diffracted grating structure, which diffracts the light, as shown in Figure 6 of the present application.

With respect to a phase mask, there are two possible configurations. The Littrow configuration has an angle of incidents at or close to the Littrow angle, which is defined as the angle of incidence at which the angle of the diffracted first order equals to the angle of incidence. The grating period of the periodic modulation in the photoresist equals the grating period of the phase mask.

In a second configuration, there is a normal incidence of light for the phase mask wherein the phase mask has a period which equals to a period which is double the grating period to be printed into the photoresist. Additionally, parameters such as grating depth and duty cycle are defined in such a way that the transmitted zero order is close to zero whereas the plus one and minus one order are equal.

Applicants have attached Exhibit A which shows the use of the chrome mask on quartz or the holographic method using crossed laser beams in the reference to Lyndin. In contrast, Exhibit B illustrates the operation of the phase mask of the presently claimed invention.

In order to further clarify the distinction between the phase mask of the presently claimed invention and the phase shift mask of Lyndin, Applicants have amended independent claim 42 so that it now recites that the phase mask has a transparent region with a diffraction grating and that parts of the diffraction grating are masked. Thus, in addition to the terminology being different, the independent claim 42 now specifically recites the defining nature of the differences between the phase mask of the claimed invention and the disclosure of the phase shift mask of Lyndin.

The secondary reference to Capodieci U.S. Patent No. 6,013,396 has been cited for disclosing "a phase mask for use in this type of photolithographic process". Applicants submit that Capodieci also has a phase-shift mask which once again, is not the same as the defined phase mask of the present invention. A phase shifting mask consists of alternate opaque transparent regions as indicated at claim 1, column 11, lines 40 and 41 of Capodieci as well as in the drawings. These regions of alternate opaque and transparent areas correspond to the area in which the grating is to be manufactured in Capodieci.

Applicants' invention is a structure wherein only transparent regions in the phase mask have the diffraction grating as is specifically claimed in independent claim 42.

Each of the phase shift mask structures used in Capodieci and Lyndin, have alternate opaque and transparent areas in order to define the regions which provide the grating structure whereas, in direct contradistinction, the present invention utilizes diffraction of the transparent region to form the grating structure as shown in the drawing and claimed in independent claim 42 which requires that the phase mask have both a transparent region with a diffraction grating and parts of the diffraction grating masked.

Therefore, it is submitted that even if, for purposes of argument, the references were combined, Applicants' invention as defined by claim 42, would not result. The remaining claims 33-62 and 93-97, which are newly added claims depending ultimately from independent claim 42 and are thus also allowable.

Claims 42-62 were also rejected under 35 U.S.C. 112, second paragraph as being indefinite for the reasons indicated at page 3 and 4 of the Patent Office Action. In response to these rejections, Applicants have amended claims 42, 43, 48, 55 and 61 as well as added new claims 93-97 to correct antecedent basis problems and to provide the proper range of limitations within each claim to address the rejection under 35 U.S.C. 112. It is submitted that claims 32-62 and newly added claims 93-97 meet the requirements of 35 U.S.C. 112.

Claims 42-62 were also provisionally rejected under 35 U.S.C. 103 as claiming the same invention as claims 1-21 of copending application serial number 10/182,247, as discussed at the bottom of page 4 and the top of page 5.

Applicants submit that this rejection is moot as claims 1-21 of copending application number 10/182,247 have been canceled.

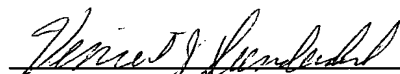
Therefore, in view of the changes to the claim structure to address the rejections under 35 U.S.C. 112 and the changes to the specification to address the Examiner's objections to the specification and in view of the distinguishing features between the claimed invention and the reference, as defined by independent amended claim 42 and the dependent claim 43-62 and 93-97, Applicants respectfully request that this application be allowed and be passed to issue.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #080314.48609CP).

Respectfully submitted,

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